



# Key Opportunities And Challenges Of Data Migration In Cloud

ONKAR RAUT

SEMESTER 4

DESIGNATION: STUDENT OF MASTERS OF COMPUTER APPLICATION IN L.B.H.S.S. TRUST'S INSTITUTE OF COMPUTER APPLICATION (HIRAY COLLEGE) BANDRA (E)

## Abstract

**Data migration** is the process of selecting, preparing, extracting, and transforming data and permanently transferring it from one computer storage system to another. Additionally, the validation of migrated data for completeness and the decommissioning of legacy data storage are considered part of the entire data migration process. Data migration is a key consideration for any system implementation, upgrade, or consolidation, and it is typically performed in such a way as to be as automated as possible, freeing up human resources from tedious tasks.

Cloud migration comes along with both challenges and advantages, so there are different academic research and technical applications on data migration to the cloud.

Data migration occurs for a variety of reasons, including server or storage equipment replacements, maintenance or upgrades, application migration, website consolidation, disaster recovery, and data center relocation

## Introduction

Migration is a process of moving data from one platform/format to another platform/format. It involves migrating data from an old system to the new system without affecting the active applications and ultimately redirecting all I/O activities to the new device. In simple words, it is the process of fetching data from different source systems into a single target system. Data migration is a multi-step process that begins with an analyzing old data and culminates in the loading and normalizing data in new applications. This process involves scrubbing the legacy data, mapping data from the old system to the new system, designing conversion programs, building and testing the conversion programs that perform the conversion, and matching the converter. Data migration could also refer to as the process of making an exact copy of an organization's current data from one device to another device; preferably without disabling or disabling active applications; then redirect all input/output (I/O) activities to the new device. There are a variety of circumstances that may cause an organization to migrate data, including: Server or storage technology replacement or upgrade; Server or storage consolidation; Relocation of the data center; Server or storage equipment maintenance, including workload balancing or other performance-related maintenance. The above scenarios are fairly routine parts of IT operations in organizations of nearly any size. Data migration, as an essential aspect of legacy systems, modernization projects, has been recognized as a challenging task that can lead to project failure as a whole. Industry survey results [4] reveal that the data migration market is rapidly growing and business companies annually invest billions of dollars in data migration tasks; however,

only 16% of projects successfully complete their data migration tasks (i.e., delivered on time and within budget)—64% of data migration projects failed to deliver on time and 37% were over budget. The main reason for overriding time and budget is the lack of a well-defined methodology that can help deal with the complexity of data migration tasks. In general, data migration is the process of transferring data from old data sources of an old system to new data sources of the target system, where the old and new systems have different data structures. There are several issues that may complicate this process greatly. First, legacy systems often have a number of heterogeneous data sources designed with different data modelling tools or their interpretation under various semantics. This requires a thorough understanding of ancient data sources from various aspects, such as explicit or implicit data constraints, interrelationships across different data sources, and data availability. Second, legacy systems may contain inaccurate, incomplete, duplicate or inconsistent data. On the other hand, new systems often require additional semantic restrictions on data after it is migrated. Thus, scaling data quality to the level of new systems can be costly and time-consuming. A previous study showed that 62% of data migration projects have significant data quality problems in new systems. Third, various data migration tasks such as data identification, validation, and cleansing must be performed frequently in the project and specification changes occur frequently to fix the detected problems. It is estimated [6] that 90% of the initial specifications change and over 25% of the specifications change more than once during the life of a data migration project. These issues highlight the importance of methodologies and best practice approaches that can be used to guide through the process of data migration. We try to introduce various aspects of data migration to be clear for reader and how we solve data migration security and privacy challenge using suggested model. In Section 2 we introduce background about data migration strategy, challenges, need, phases, and policy. In Section 3 we introduce data migration types, categories, methodology, and risks and its solutions. In Section 4 we speak about cloud computing, comparing it with traditional data storage, and existing solutions to secure the cloud. In Section 5 we suggested proposed model that introduces efficient way to secure data migration in the cloud.

#### Objectives and Scope of paper:

To achieve the objective of this study, three research questions are formulated

**RQ 1:** What are the reported advantages to store data into the cloud?

**RQ 2:** What are the key challenges to migrate data into the cloud according to the literature?

**RQ 3:** How cloud migration strategies and models help to deal with data migration concerns?

#### Research Methodology

The required data were collected to conduct the research by using electronic libraries, namely, Google search and Google scholar. Google and Google Scholars are the most vital tools for information seeking by researchers and scientists .

#### Analysis and Findings

RQ1 What are the reported advantages to store data into the cloud?

- **Cost Effective Solution:**  
By only using the cloud storage service, the business outsources the storage problem. By using online data storage, the enterprise reduces the expenses of internal resources. With this technology, the company itself does not need any inner power and support to manage and store their data; the cloud storage vendor handles all. There are some cloud storage services provided which give cloud storage for a lifetime at an affordable price, which is a win-win offer for small business and individual users.

- Storage:

Cloud Computing almost gives unlimited storage capacity storage which is one of the hassle free aspect for the business which allows them to do their core business

- Multiple users:

Same cloud environment can be used by more than one persons. Same file can be accessed by more than one person from any part of world at real time

- Security:

Anything which is related to internet has the security concern. Every business use cloud so they make sure that they have good security

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Also cloud vendor duplicates the data in different data centers so incase data gets lost we have the backup

**RQ 2:** What are the key challenges to migrate data into the cloud according to the literature?

- Vendor Management

From the perspective of businesses, the process of data migration requires businesses to trust their vendor. Concerns exist whether technical issues on the vendor's side could affect data security on the cloud. It is therefore imperative that data migration vendors provide SLAs that prioritize the concerns of their clients. Since cloud computing offers a standardized, multi-tenant infrastructure, cloud vendors may not offer the same level of SLAs as IT managers are accustomed to[4].

- Data Security Concerns

For any business organization, data is the most crucial resource. It may consist of business-centric data along with other related data critical for its existence [3]. Any compromise or threat to its security is a risk that businesses would not want to undertake. The same notion spills into migrating data to the cloud. A small hint suggesting that the clouds not secure will make organizations develop cold feet towards migration. Any cloud infrastructure will comprise of patchworks of open source code, which creates security vulnerabilities. Additionally, public clouds are multi-tenant, and such elements as vulnerabilities or defects of a co-subscriber's code could substantially affect other applications. To tackle this concern, many cloud vendors are performing "on boarding audits" to reassure prospective customers that their level of security is appropriate. Nonetheless, its level of conviction still needs confirmation.

- Trust deficit about cloud security:

Although cloud market giants have been promoting their in-place latest data security model, the NSA snooping scandal creates doubt and rethink on storing all the critical and confidential data in the cloud. This trust deficit impacts all major stakeholders like individual citizens, businesses, and governments. As data stored in the cloud is easily accessible from anywhere, data breach due to low password security or hacking can result in a compromise of personal and business data. The organizations hosted their data locally with having full control and authority. When they decide to migrate to the cloud, they may feel more vulnerable because hackers tend to target big data centers.

**RQ 3:** How cloud migration strategies and models help to deal with data migration concerns?

Through comparing and analyzing, we can categorize the migration into three strategies vitally: migration to IaaS, migration to PaaS, and migration to SaaS.

- Migration to IaaS

Infrastructure as a service is a type of hosting, which incorporates network access, routing services, and storage. IaaS supplier generally provides hardware and authoritative services used to store applications and a platform for running applications. A virtual machine is built for an application, which is stacked with all the products that will at last run the cloud. When the virtual machine is transferred to IaaS vendors hosting environment and deployed to run. IaaS is the most ideal migration strategy for moving applications to the cloud when there is no opportunity to reengineer the applications for a cloud

- Migration to PaaS

Platform as a service is an application development and deployment platform delivered as a service to developers over the internet, which gives the hardware in addition to a specific amount of applications like databases, middleware, and development tools. Migration

dependent on PaaS isn't compulsory for resource management, but it is needed to make the system viable with the prerequisite of the PaaS vendor

Examples of PaaS: AWS Elastic Beanstalk, Windows Azure, Google App Engine, Apache Stratos, OpenShift.

- Migration to the SaaS

Software as a Service (SaaS) provides cloud infrastructure and cloud platforms to customers with software applications. The end user accesses its applications through a web browser or using an IDE (Integrated Development Environment) eliminating the need to install or maintain additional software

Example of SaaS includes Google Docs, Google Gmail and Microsoft Office 365.

#### CONCLUSION:

Cloud computing is a disruptive technology that is set to change how IT systems are deployed as a result of its obviously modest, simple and versatile nature. The discoveries of this contextual research show that cloud computing can be a fundamentally less expensive option as compared to buying and maintaining framework infrastructure in-house. Moreover, cloud computing might actually eliminate many support-related issues since there would be no actual infrastructure to keep up. Despite these benefits, this contextual research showed that some significant challenges and risks should be considered before organizations could migrate their IT frameworks to the cloud.

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